

70 OCE
3 NOV 1981

SMALL BEACH EROSION CONTROL PROJECT

BELFAST CITY PARK BEACH
BELFAST, MAINE

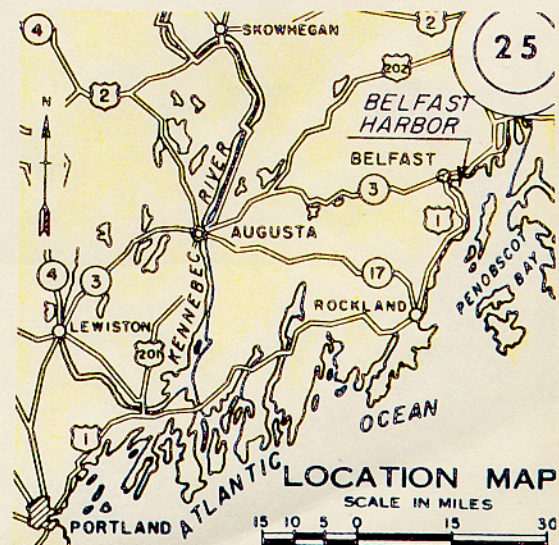
RECONNAISSANCE REPORT

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASSACHUSETTS

OCTOBER 1981

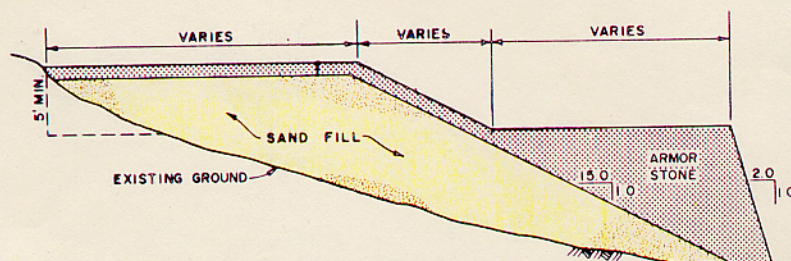
REPORT DOCUMENTATION PAGE				Form Approved OMB No. 0704-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.					
1. REPORT DATE (DD-MM-YYYY) October 1981		2. REPORT TYPE Reconnaissance Report		3. DATES COVERED (From - To)	
4. TITLE AND SUBTITLE Small Beach Erosion Control Project Belfast City Park Beach Belfast, Maine Reconnaissance Report				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) U.S. Army Corps of Engineers, New England Division				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) U.S. Army Corps of Engineers New England Division 424 Trapelo Road Waltham, MA 02254				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Army Corps of Engineers New England Division 424 Trapelo Road Waltham, MA 02254				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT The investigation described in the report encompass Belfast City Park Beach in Belfast, Maine which is located on Belfast Bay (see the location map), at the northwestern end of Penobscot Bay, roughly midway along the Maine coast. Examined during this reconnaissance were present and future saltwater-related recreational needs; measures capable of satisfying such needs; and economic, environmental and social considerations. All studies, which are based on existing data, were carried to the level of detail needed to determine whether it is socially, economically, and environmentally justified to proceed with Stage 2 and a detailed project report. It has been concluded that the problem of the erosion and distribution of beach sand at Belfast City Park Beach is causing rapid deterioration of the beach and that the beach is essential to the city of Belfast and the surrounding area. It has also been concluded that further detailed study should be undertaken for developing a method of construction to provide a more stable beach for the long-range needs of the area.					
15. SUBJECT TERMS Belfast, Design Criteria, Beach Erosion					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT UNCLASSIFIED	18. NUMBER OF PAGES 19	19a. NAME OF RESPONSIBLE PERSON Mathew Connell
a. REPORT UNCLASSIFIED	b. ABSTRACT UNCLASSIFIED	c. THIS PAGE UNCLASSIFIED			19b. TELEPHONE NUMBER (include area code) 978-318-8349

BELFAST CITY PARK BEACH
BELFAST, MAINE
VICINITY AND LOCATION MAPS
OCTOBER 1981

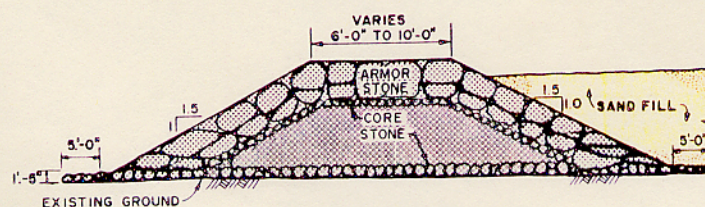


BELFAST CITY PARK BEACH
BELFAST, MAINE

STUDY LIMITS



TYPICAL PROFILE
TERMINAL GROIN
NOT TO SCALE



TYPICAL SECTION
TERMINAL GROIN
NOT TO SCALE

CONSIDERED PLANS OF IMPROVEMENT

BELFAST CITY PARK BEACH
BELFAST, MAINE

SMALL BEACH EROSION CONTROL PROJECT
RECONNAISSANCE REPORT

TABLE OF CONTENTS

	<u>Page No.</u>
INTRODUCTION	1
STUDY AUTHORITY	1
SCOPE OF STUDY	1
STUDY PARTICIPANTS AND COORDINATION	1
OTHER STUDIES	1
REPORT AND STUDY PROCESS	1
PROBLEM IDENTIFICATION	2
NATIONAL OBJECTIVES	2
NED Objective	2
EQ Objective	2
EXISTING CONDITIONS	2
CONDITIONS IF NO FEDERAL ACTION IS TAKEN	3
PROBLEMS, NEEDS AND OPPORTUNITIES	3
PLANNING CONSTRAINTS	3
PROBLEM AND OPPORTUNITY STATEMENTS	4
FORMULATION OF PRELIMINARY PLANS	5
PLAN FORMULATION RATIONALE	5
PLANS OF OTHERS	5
MANAGEMENT MEASURES	5
PRELIMINARY PLANS	6
Plan 1	6
Plan 2	6
Plan 3	6
ENGINEERING STUDIES	6
Geomorphology	6
Shore History	7
Analysis of Shore Processes	7
Waves	7
Prevailing Winds	7
Storms	7
Currents	7
Tides	8
Design Criteria	8
Design Tide	8
Design Wave	8
Size and Slopes of Stones in Structures	8
Sandfill	8

TABLE OF CONTENTS (Cont'd)

	<u>Page No.</u>
Project Justification	8
Economic Analysis	8
Estimate of Benefits	9
Recreational	9
Loss of Land	9
Summary of Annual Benefits	10
Allocation of Cost	10
Apportionment of Cost	10
Estimate of First Costs, Cost Sharing and Annual Charges	10
Comparison of Benefits and Costs	13
Environmental Analysis	14
Assessment and Evaluation of Plans	14
 STUDIES TO BE ACCOMPLISHED IN STAGE 2	 15
ECONOMIC STUDIES	15
SOCIAL AND CULTURAL STUDIES	15
ENVIRONMENTAL STUDIES	15
STAGE 2 ENGINEERING STUDIES	15
CONCLUSIONS	16
Local Requirements	16
Conclusions	17
Recommendations	17
 APPENDIX A - PERTINENT CORRESPONDENCE	 A-1

INTRODUCTION

STUDY AUTHORITY

This reconnaissance report is submitted under the authority of Section 103 Beach Erosion Control of the River and Harbor Act of 1962, as amended.

SCOPE OF STUDY

The investigations described in the report encompass Belfast City Park Beach in Belfast, Maine which is located on Belfast Bay (see the Location Map), at the northwestern end of Penobscot Bay, roughly midway along the Maine coast. Examined during this reconnaissance were present and future saltwater-related recreational needs; measures capable of satisfying such needs; and economic, environmental and social considerations. All studies, which are based on existing data, were carried to the level of detail needed to determine whether it is socially, economically, and environmentally justified to proceed with Stage 2 and a detailed project report.]

STUDY PARTICIPANTS AND COORDINATION

The city of Belfast, in a letter dated 20 November 1981 (see Appendix A), requested the Corps of Engineers to undertake a Small Beach Erosion Control Study. Coordination with city officials, private citizens, and interested groups has been maintained since the initial request for the study was received. Should the study be continued into Stage 2, Federal and state agencies would be contacted for their input, review and comments, particularly those sharing responsibilities for environmental protection, coastal zone management, and fish and wildlife resources.

OTHER STUDIES

At this time there are no other studies involving Belfast City Park underway. This includes Corps work and private studies.

THE REPORT AND THE STUDY PROCESS

The reconnaissance report concludes Stage 1 of a two-stage planning process. The purpose of this stage of the study is to investigate the problems and existing conditions at Belfast City Park. When the results of these investigations are positive, the Division Engineer recommends that study be continued into the final planning phase. In the next stage we would investigate in depth the environmental, economic, and engineering factors relating to the detailed, alternative plans and would propose a plan of action to address the problem. The results of the reconnaissance stage are found in the paragraphs entitled "Preliminary Plans."

PROBLEM IDENTIFICATION

NATIONAL OBJECTIVES

According to the Principles and Standards procedure established by the United States Water Resources Council on multi-objective planning, national objectives or goals must be examined during formulation of alternative plans to determine their impacts on the total environment. There are two national objectives: national economic development (NED) and environmental quality (EQ).

NED Objective

One goal is to enhance national economic development by increasing the value of the Nation's output of goods and services and to improve economic efficiency. There should be a net positive contribution to the gross national product, in that the average annual benefits resulting from the proposed plans should be greater than the average annual costs required to implement and maintain the project.

EQ Objective

Another goal is to enhance the quality of the environment. This can be achieved through the management, conservation, preservation, creation, restoration or improvement of the quality of certain natural, cultural and ecological resources.

These two national goals are given equal importance during the planning process. Also assessed during this process are the project's impacts on regional economic development (RED) and other social effects (OSE).

EXISTING CONDITIONS

Belfast City Park is located midway along the south west side of Belfast Bay, approximately 30 miles south of Bangor. The park is a very popular city-owned recreational area. The park area extends approximately 1,100 feet behind the rocky shorefront. On the ocean side of the park is Belfast City Park Beach which is a rocky beach extending along the 700 feet of park shorefront. At present there is no dry beach space available at mean high water. The foreshore area consists of a medium-to-coarse grade of sand, is relatively flat and is strewn with large rocks. The backshore area is protected by an embankment which is between five and ten feet high. The water is currently undermining the base of the embankment at high water. There is evidence of very severe erosion during storm conditions. The backshore area consists of approximately 28.5 acres of publicly owned land which is bound to the north and the south by private property. The park facilities include parking areas, a swimming pool, a ballfield, playground equipment (swings, etc.), picnic areas, a bathhouse and restroom facilities.

CONDITIONS IF NO FEDERAL ACTION IS TAKEN

If no beach maintenance procedures are implemented, the foreshore area will continue to erode. This erosion will result in the continued undermining of the backshore park.

PROBLEMS, NEEDS AND OPPORTUNITIES

The problem to be addressed is the severe erosion of the foreshore area at Belfast City Park Beach. This progressive erosion is resulting in the loss of valuable recreational area and will soon be threatening the parks facilities. City officials and the residents of the city have become very concerned with this problem and have asked the Corps for assistance in determining the most practical method of correcting it. There exists at Belfast City Park the need for a dry beach bathing area and the opportunity to protect the existing park. This situation deserves careful consideration.

PLANNING CONSTRAINTS

Throughout the process of developing and selecting plans of improvement, every attempt will be made to develop plans that solve the beach erosion problems and fulfill the needs of the area. Before this process begins, consideration must be given to known constraints that can limit the options available for solving these problems. These constraints can cut across a broad spectrum of concerns, including natural conditions, economic limits, social and environmental factors, and legal restrictions.

The following constraints were found to be relevant to this study:

- Local officials wish to keep the non-Federal financial responsibility to a minimum; therefore, plans will be formulated that would not place unrealistic financial burdens on the community.
- Current beach erosion regulations restrict the Corps from participating in the cost of projects along privately owned shores. Because this beach is located in a predominantly residential area, available beach space is limited.
- Residents live adjacent to and behind the beach; therefore, plans should be formulated to avoid blocking their view of the beach.

These and other constraints, including the current state of the art of proper construction procedures and methods and any state and local legal restrictions, would be considered in the second and final study stage.

PROBLEM AND OPPORTUNITY STATEMENTS

Problem and opportunity statements express the water and related land resource problems and needs of the study area in a positive manner. Problem and opportunity statements can be delineated basically by two methods:

- Addressing known areas of public concern.
- Anticipating future "without project" conditions to identify problems and needs not so readily apparent to the public at the present time.

Based on considerations of known areas of public concern and anticipated "without project" conditions, the following problem and opportunity statements for the 50-year period of analysis were established:

- Contribute to the continued recreational use of the beach by the general public.
- Contribute to the economic well-being of the study area.
- Preserve the environmental quality of the beach.
- Contribute to the stability of the beach that is subject to serious erosion.

A detailed analysis of the associated problems and opportunities was not possible in this reconnaissance report because of funding limitations and the scope of the study. These problems and opportunities will be addressed in detail if the study is continued into the next stage.

FORMULATION OF PRELIMINARY PLANS

PLAN FORMULATION RATIONALE

The planning process involves the development and evaluation of structural and nonstructural plans formulated from the measures listed in the "Management Measures" subsection. These measures are evaluated for their potential as independent plans or as elements of broader plans. Each element is screened to determine its engineering and economic feasibility and the degree of public acceptance. Those which are not practicable or not economically feasible are eliminated from further consideration unless significant nonmonetary benefits would be derived, such as social well-being or environmental quality. Any preliminary plans that are not acceptable to the public or which could not feasibly be implemented are also eliminated from further study. If the study is continued into Stage 2, the remaining plans are then evaluated according to the Principles and Standards of the U.S. Water Resources Council. Each plan is evaluated in detail to determine its impacts on national economic development, environmental quality, social well-being, and regional economic development. A comparative analysis of all alternatives then results in the selection of a recommended plan.

PLANS OF OTHERS

At this point, there have been no definitive plans formulated for Belfast City Park Beach, Belfast, Maine. We will, however, try to conform to the wishes of the local interests whenever possible.

MANAGEMENT MEASURES

During formulation of preliminary and detailed plans to reduce beach erosion, a broad range of possible management measures is considered. If the study is continued into the second stage, different interest groups will be contacted and several structural and nonstructural management measures will be evaluated. These measures will include:

- Periodic beach nourishment.
- Dune restoration and grass planting.
- Controlled access to and from the beach.
- Limiting the number of visitors to the beach.
- Construction of an offshore breakwater to protect the existing beach.

PRELIMINARY PLANS

In this stage of the report a 50 foot wide level beach berm will be considered. Berm widths of 75 and 100 feet will also be considered in the detailed project report. Schemes will include sandfill with and without structures, both terminal and intermediate, and will be evaluated for all known environmental impacts that could affect the beach and adjacent shoreline. The beach improvements considered in Stage 1 provide benefits for beach use as well as backshore protection for shore structures.

At this stage of the study process we have considered the practicability of three alternative plans and are making preliminary benefit-cost analyses of them to determine whether continued study is justified.

We are considering the following 3 plans and options:

Plan 1

Plan 1 will consist of beach widening by direct placement of suitable sandfill along the beach for a distance of approximately 700 feet in front of Belfast City Park. This plan provides for a 50 foot wide level berm and periodic beach nourishment. An estimated 19,000 cubic yards of sandfill will be required.

Plan 2

Plan 2 will consist of beach widening by direct placement of suitable sandfill along the beach for a distance of approximately 700 feet in front of Belfast City Park and the construction of two terminal groins to compartmentalize the beach. This plan provides for a 50 foot wide level berm and periodic beach nourishment. An estimated 19,000 cubic yards of sandfill and 3,060 tons of stone will be required.

Plan 3

Plan 3 will consist of beach widening by direct placement of suitable sandfill along the beach for a distance of approximately 700 feet in front of Belfast City Park and the construction of two terminal groins and one low profile groin to compartmentalize the beach. This plan calls for a 50 foot wide level berm and periodic beach nourishment. An estimated 19,000 cubic yards of sandfill and 4,260 tons of stone will be required.

ENGINEERING STUDIES

Geomorphology

Because of the location and the configuration of Belfast City Park Beach on Belfast Harbor and at the mouth of the Passagassawakeag

River, material on the beach is constantly changing. The shoreline of the beach has been reshaped by a combination of tidal, wind and wave induced erosion processes. The beach is the result of outwash material which is mostly till. The till being an unsorted, unstratified mixture of clay, silt, sand, gravel, and cobbles. The backshore is made up mostly of till and bedrock. The bedrock consists largely of metamorphic rock and some areas of intrusive igneous rocks.

Shore History

A detailed survey of the beach will be required to evaluate the shoreline and offshore changes. This survey and historic shoreline change maps will be discussed and evaluated. Field inspection and discussions with local interests indicate that both erosion and accretion changes in the mean high water line have been observed, with the net result being erosion.

Analysis of Shore Processes

The natural processes of erosion and accretion at the study area are influenced by several forces. These forces that will be considered in the next stage:

Waves. The study area is directly exposed to wave action from the east-southeast quadrant with approximately 8 miles of fetch across Belfast Bay. No wave measurements are available for the immediate area. It is estimated that no great wave threats will attack the area due to the bay's seclusion from the Atlantic Ocean. Most waves approaching the shoreline are those caused by storms and winds in the immediate area.

Prevailing Winds. Storm driven winds contribute substantially to the backshore erosion at Belfast City Park Beach. Wind data from the National Weather Service Wind Records at Portland, Maine will be evaluated to determine wind conditions as they impact the beach. This will be accomplished in the next stage of the study.

Storms. During the more frequent serious storms for this area, southeast winds prevail. Although this area is subject to damaging hurricanes and extraordinary storms accompanied by exceptionally high tide levels and damaging waves, their rare occurrence precludes the economic and practical feasibility of a design completely resistant to hurricane and extraordinary storm wave force damage.

Currents. An inspection of the 1980 U.S. Coast and Geodetic Current Tables will be performed. Currents that are generated by storm-driven waves that affect the area will be investigated during the study to determine their effect on sand movement in and out of the area.

Tides. Tides in the area are semi-diurnal. Mean and spring tide ranges in the study area are 10.0 and 11.5 feet above MLW respectively. Mean tide elevations throughout the area are considered directly proportional to that at Portland, Maine.

Design Criteria

The most natural, practical method of correcting the existing beach erosion problem at Belfast City Park Beach will be determined in the next stage of this study. Certain design criteria will be evaluated in order to determine the protection measures appropriate for the study area. In this reconnaissance study, the following design criteria was used:

Design Tide. A design tide of 12.0 feet above mean low water is considered to be the most practical elevation for this area. This represents a tide of 2.0 feet above the mean high tide and is expected to occur about once every five years.

Design Wave. The final design wave criteria will be determined as a result of wave hindcast and refraction studies in the next stage of the study. The selected wave height will be determined by establishing the maximum wave that can be supported by the water depth that exists at the head of the proposed structures. According to the "Solitary Wave Theory," this wave height $H=d/1.28$, d is the existing depth at the head of the proposed structures during the design tide.

Size and Slopes of Stones in Structures. The size and slopes of stones to be used in proposed structures will be determined according to standards established in the "Shore Protection Manual, 1977." Consideration will be given to the most practical and economical construction method.

Sandfill. Any sandfill required to complete the project will be taken from a nearby land source or a designated offshore borrow area and will comply with the most recent Federal and State environmental quality standards.

Project Justification

Any proposed plan of improvement must be economically justified by an annual benefit-cost analysis which will be performed for each plan. The benefits for a small beach erosion control project are derived from both recreational use and reduced land loss of the beach.

Economic Analysis

The present analysis has been limited to a static approach to the development of recreational benefits. If additional study appears warranted, future analysis will include measures of dynamic events such as

population growth. Because existing information on the historical rate of shore recession is minimal, no benefit has been taken for prevention of loss of land. Additional investigation may allow for a quantification of this benefit.

Estimate of Benefits

From the existing conditions it can be seen that overcrowding does indeed affect Belfast City Park Beach. The existing capacity is zero at mean high water (MHW), but the maximum daily demand is 840 persons. This is the city's only public beach and moderate driving is necessary to reach other beaches in the area. Creating additional beach space at Belfast City Park Beach would provide added recreational benefits.

Recreational. Recreational benefits are derived from the basic supply and demand relationship. The net difference between project demand (with the project) and capacity (without the project) is evaluated as a project benefit. Since the present capacity is zero, the project benefit would be equal to the project demand with the project.

Benefits for Belfast's only public beach are based on a 80-day swimming season. This season has been reduced 25 percent to take into account inclement weather, resulting in a season of 60 good weather days. Of the 60-day season, 35 days are considered average attendance days. From talking to local officials the beach would have an estimated attendance of 360 people on average days and 840 people on peak days. A turnover of once a day was used in the estimation. The Corps' regulation of 75 square feet per person would be satisfied.

Based on the guidelines for assigning points for general recreation, a unit day value of \$1.75 was determined to reflect the maximum benefit per beach visit if a beach is developed. This unit day value is considered a good preliminary estimate for this stage of the study. In the detailed project report a more detailed benefit analysis will be done which may change the preliminary estimate.

The quantification of benefits was developed in compliance with Corps regulations, which require the existence of dry beach area of at least 75 square feet per bather to obtain the maximum value from a beach visit at time of peak use. From surveys done for similar studies, an optimum value of \$1.75 per beach visit has been established for fully developed beach areas such as those in Belfast. This value is based on the assumption that no overcrowding exists.

Loss of Land. Based upon a conservative erosion rate of 1 foot per year, project implementation would prevent the loss of 800 square feet (.018 acre) per year. Based on recent studies done in this area, the value of land at Belfast City Park is estimated to be \$60,000 per acre. Project implementation would prevent loss of park land over the life of the project, estimated at \$1,100 annually.

Summary of Annual Benefits

The following table summarizes the existing and proposed dry beach area under each plan, and the benefits accruing to each plan.

TABLE 1

SUMMARY OF ANNUAL BENEFITS

35 Average days x 360 people/day x \$1.75 =	\$22,050
25 Peak days x 840 people/day x \$1.75 =	36,750
SUBTOTAL	\$58,800
Loss of land	1,100
TOTAL	\$59,900
	say \$60,000

<u>PLAN</u>	<u>EXISTING CAPACITY</u>	<u>PROPOSED CAPACITY</u>	<u>ANNUAL BENEFIT</u>
1	0	1,175	\$60,000
2	0	1,175	\$60,000
3	0	1,175	\$60,000

Allocation of Cost

The cost of this project will be allocated to recreational use and shore protection in proportion to the benefits realized by each purpose, using the standard benefit-to-cost methods. The analysis is based on current estimates of costs and benefits and is subject to change at the time of construction, depending on the actual costs.

Apportionment of Cost

The first cost of construction of the proposed beach improvement will be apportioned between Federal and non-Federal interests, seventy percent and thirty percent, respectively. The estimated first cost is based on September 1981 price levels.

Estimate of First Costs, Cost Sharing and Annual Charges

Estimates of first costs and annual charges are based on 1981 price levels, a 50-year period of analysis, and an interest rate of 7 5/8 percent for both Federal and non-Federal charges.

TABLE 2
FIRST COST - PRELIMINARY PLAN 1

Sandfill	19,000 c.y. x \$5.50/cy	\$104,500
Contingencies		<u>20,900</u>
	Subtotal	\$125,400
Engineering and Design		<u>10,300</u>
	Subtotal	\$135,700
Supervision & Administration		<u>10,300</u>
	TOTAL FIRST COST	\$146,000

COST SHARING

Federal Share	(70%)	\$102,200
Non-Federal Share	(30%)	\$ 43,800

ANNUAL CHARGES - PRELIMINARY PLAN 1

Federal

Interest:	(0.07625 x \$102,200)	\$ 7,800
Amortization:	(0.00216 x \$102,200)	250
Nourishment:	2,675 cy x \$5.50/cy	<u>14,700</u>
	TOTAL FEDERAL/YEAR	\$22,750

Non-Federal

Interest:	(0.07625 x \$43,800)	\$ 3,350
Amortization:	(0.00216 x \$43,800)	100
Nourishment:	1,145 cy x \$5.50/cy	<u>6,300</u>
	TOTAL NON-FEDERAL/YEAR	\$ 9,750

TOTAL ANNUAL CHARGES \$32,500

BENEFIT-TO-COST 1.85

TABLE 3

FIRST COST - PRELIMINARY PLAN 2

Sandfill	19,000 cy x \$5.50/cy	\$104,500
Stone	3,060 tons x \$30/ton	<u>91,800</u>
	Subtotal	\$196,300
Contingencies		<u>39,300</u>
	Subtotal	\$235,600
Engineering and Design		<u>19,700</u>
	Subtotal	\$255,300
Supervision & Administration		<u>19,700</u>
	TOTAL FIRST COST	\$275,000

COST SHARING

Federal Share	(70%)	\$192,500
Non-Federal Share	(30%)	\$ 82,500

ANNUAL CHARGES - PRELIMINARY PLAN 2

Federal

Interest:	(0.07625 x \$192,500)	\$14,700
Amortization:	(0.00216 x \$192,500)	400
Nourishment:	(1,190 cy x \$5.50/cy)	<u>6,550</u>
	TOTAL FEDERAL YEAR	\$21,650

Non-Federal

Interest:	(0.07625 x \$82,500)	\$ 6,300
Amortization:	(0.00216 x \$82,500)	200
Nourishment:	(510 cy x \$5.50/cy)	2,800
Maintenance:	(300 tons x \$30/ton)	<u>9,000</u>
	TOTAL NON-FEDERAL/YEAR	\$18,300

TOTAL ANNUAL CHARGES \$39,950

BENEFIT-TO-COST 1.50

TABLE 4

FIRST COST - PRELIMINARY PLAN 3

Sandfill	19,000 cy x \$5.50/cy	\$104,500
Stone	4,260 tons x \$30/ton	127,800
	Subtotal	\$232,300
Contingencies		46,500
	Subtotal	\$278,800
Engineering and Design		25,600
	Subtotal	\$304,400
Supervision & Administration		25,600
	TOTAL FIRST COST	\$330,000

COST SHARING

Federal Share	(70%)	\$231,000
Non-Federal Share	(30%)	\$ 99,000

ANNUAL CHARGES - PRELIMINARY PLAN 3

Federal

Interest:	(0.07625 x \$231,000)	\$17,600
Amortization:	(0.00216 x \$231,000)	500
Nourishment:	1,065 cy x \$5.50/cy	5,850
	TOTAL FEDERAL YEAR	\$23,950

Non-Federal

Interest:	(0.07625 x \$99,000)	\$ 7,550
Amortization:	(0.00216 x \$99,000)	200
Nourishment:	455 cy x \$5.50/cy	2,500
Maintenance:	430 tons x \$30/ton	12,900
	TOTAL NON-FEDERAL/YEAR	\$23,150

TOTAL ANNUAL CHARGES \$47,100

BENEFIT-TO-COST 1.27

Comparison of Benefits and Costs

Any Federally funded project must assure a return of at least one dollar of national benefit for every dollar spent on construction of the project. This is determined by a benefit-cost ratio which must be greater than or equal to 1.00. Table 4 contains a summary of the benefit-cost ratios for the alternative plans.

TABLE 5

SUMMARY OF PROJECT JUSTIFICATION

<u>Plan</u>	<u>First Cost</u>	<u>Annual Charges</u>	<u>Benefit</u>	<u>B/C</u>
1	\$146,000	\$32,500	\$60,000	1.85
2	\$275,000	\$39,950	\$60,000	1.50
3	\$330,000	\$47,100	\$60,000	1.27

Environmental Analysis

There are certain environmental impacts associated with beach protection projects. There may be some impacts to the local human environment such as noise, dust and traffic in the project vicinity, because sandfill and rock must be trucked in from a suitable land source for beach restoration and groin construction. Impacts to the marine environment at the fill site will be of minor intensity and short duration. Turbidity levels in the shoreline area will be increased temporarily, but will return to normal once project activities are complete. Benthic organisms occupying the fill site may be destroyed through burial. Pelagic organisms will be able to vacate the area until filling activities are complete. Both benthic and pelagic organisms will reinhabit the area once conditions return to normal. Beach vegetation, which is the habitat of shore birds and small rodents, may be impacted by the project.

Assessment and Evaluation of Plans

In the second stage of the study, the impacts of each plan, as well as any trade-offs or mitigation that may be required, will be evaluated and discussed.

STUDIES TO BE ACCOMPLISHED IN STAGE 2

The following is a brief summary of additional detailed studies to be accomplished in Stage 2 and presented in a detailed project report.

ECONOMIC STUDIES

Only preliminary economic studies, using available information, were conducted during the Stage 1. In Stage 2, which culminates the detailed project report, a detailed economic analysis of all the benefits relating to this beach will be investigated and evaluated. Items to be considered include increased recreational benefits, supply, demand, projected attendance, loss of land, and impacts if no Federal action is taken.

SOCIAL AND CULTURAL STUDIES

The social and cultural features of the area as they affect Belfast City Park Beach and the Belfast area will be investigated. These include increases in population, both past and predicted future. The area will be evaluated as a cultural resource as will the effect that an improvement project will have upon that cultural resource. Coordination will be maintained with state and local historic commissions throughout the study.

ENVIRONMENTAL STUDIES

Throughout the study effort, a determined and concerted effort will be made to coordinate and cooperate with Federal, state, and local environmental groups to arrive at the plan that will least affect the environment. An environmental analysis will be undertaken in the next phase of the study to investigate, evaluate, and determine what the impacts will be from construction activities along the beach.

Efforts will be made to preserve and restore any wildlife habitat lost during construction. In addition, construction activities will be undertaken between late fall and early spring in order to reduce impacts to spawning organisms.

The social and cultural impacts of the project as well as the environmental impacts will be studied.

STAGE 2 ENGINEERING STUDIES

Engineering evaluation will be undertaken to insure that the optimum criteria for the study area will be considered. This criteria will be utilized in designing the most natural and practical method of correcting the problem of continuing loss of beach material. At the same time, it will provide the city with a beach width commensurate with future protection and recreational use requirements. The project will be designed to provide protection against severe winter storms that occur

on a regular basis, rather than the less frequent extreme storms. The Stage 2 Engineering Studies will include more detailed analysis of the geomorphology, shore history, and shore processes (winds, waves, storms, currents, and tides). This will allow for a more accurate definition of the design criteria (design tide, design wave, size and slope of stones in structures, and sandfill specifications).

CONCLUSIONS

Local Requirements

The proposed improvement would require that the first cost of the project be borne by the United States (70%) and the local interests (30%). This cost would include the periodic sand nourishment for the economic life of the project. Beach erosion regulations require that Federal participation in a beach project under Section 103 is subject to the condition that local interests agree to:

a. Contribute prior to construction, in cash, 30 percent of the first cost of construction including the cost of plans and specifications; final apportionment of cost will be made after actual costs and values have been determined.

b. Assume full responsibility for all project costs in excess of the Federal limitation of \$1,000,000.

c. Maintain continued public ownership of the shore and its administration for public use during the 50-year period of analysis of the project by establishing, prior to construction, a boundary control line that will separate private property from public property use, for the realization of the public benefits upon which Federal participation is based.

d. Provide without cost to the United States, all lands, easements, and rights-of-way necessary for project construction and subsequent maintenance of the project.

e. Hold and save the United States free from all claims for damages that may arise before, during, or after prosecution of the work and subsequent maintenance of the project other than damages due to the fault or negligence of the United States or its contractors.

f. Maintain the protective measures during the economic life of the project as may be required to serve their intended purpose by contributing, in cash, 100 percent of the cost of groin maintenance and 30 percent of the cost of periodic sand nourishment for the 50-year life of the project. Such contribution is to be made prior to each nourishment operation.

g. Control water pollution to the extent necessary to safeguard the health of the bathers.

h. Comply with the requirements of non-Federal cooperation specified in Sections 210 and 305 of Public Law 81-646, approved 2 January 1971, entitled, "Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970."

i. Comply with Title VI of the Civil Rights Act of 1964 (78 State 241) and Department of Defense Directive 5500.11 issued pursuant thereto and published in Part 300 of Title 32, Code of Federal Regulations.

j. Obtain in writing from private property owners the right and use of their shorefront by the general public, all easements and rights-of-way necessary to construct and maintain the use of said beachfront, to be designated, for the economic life of the project.

Conclusions

✓ It has been concluded that the problem of the erosion and redistribution of beach sand at Belfast City Park Beach is causing rapid deterioration of the beach and that the beach is essential to the city of Belfast and the surrounding area. It has also been concluded that further detailed study should be undertaken for developing a method of construction to provide a more stable beach for the long-range needs of the area. Detailed studies will consider alternative methods of providing the most practical, economical, and environmentally acceptable method of correcting the problem in compliance with the Principles and Standards.

Recommendations

It is recommended that a detailed beach erosion control project report be prepared for Belfast City Park Beach, pursuant to the Small Beach Control Project Authority provided by Section 103 of the 1962 Rivers and Harbors Act.

APPENDIX A
PERTINENT CORRESPONDENCE



CITY OF BELFAST, MAINE 04915

FRED T. BRESLIN
City Manager

338-3370
338-3121

Set up meeting
JAN- 5, 6 - 8 - 1981
Tue. 6th Jan-1981

20 November 1980

Mr. Thomas Bruha
Army Corps of Engineers
424 Trapelo Road
Waltham, Mass. 02154

Dear Mr. Bruha,

I would refer to Mr. Braley's letter of 13 November 1980 and state unequivocally that the City of Belfast is vitally interested in controlling the shore erosion problem at the Belfast City Park. I cannot be as certain relative to the development of a beach, only because I am completely ignorant of the projected costs of such a development.

Is there a possibility that the Corps might conduct a study in order to determine what needs to be done to establish a public beach and what estimated costs of such a project might be? Would such a study involve any costs to the City?

Thank you very much for your consideration of this matter.

Very truly yours,

Fred T. Breslin
Fred T. Breslin
City Manager

ITB/vmt
cc: Norris Braley



CITY OF BELFAST, MAINE 04915

FRED T. BRESLIN
City Manager

26 October 1981

Col C. F. Edgar III
N.E. Division
Corps of Engineers
424 Trapelo Road
Waltham, Mass 02254

Dear Col. Edgar,

We have received the draft of the Belfast City Park Beach Reconnaissance Report for Small Beach Erosion Control Improvements forwarded under your cover letter dated 19 October 1981.

I concur with the findings contained therein, and I would respectfully request that the Corps of Engineers proceed with stage 2 of the study.

Very truly yours,

Fred T. Breslin
Fred T. Breslin
City Manager

FTB/vmt
cc: Thomas Bruha
City Council
City Engineer
Norris Braley